

Martinet-Ramis modulus for one Quadratic System

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Abstract: There are considered a quadratic system

$$\begin{cases} \dot{p} = p(1 - v) \\ \dot{v} = v(p - v) \end{cases} \quad (1)$$

This system is in some sense, limit system for well known Jouanolou system [1]. The system (1) has a saddlenode singularity at the origin. In this work we calculate first coefficients of Martinet-Ramis' modulus [2].

Martinet-Ramis' modulus (C, ϕ) (for saddlenode singular point) [2] are constructed by transformations reducing initial system to its (orbital) formal normal form. Solutions of the system (1) with given initial conditions can be found as a series (with respect to initial condition). Using these solutions it is possible to find coefficients of the normalizing transformations, and then to determinate coefficients of modulus.

As a result we get

Theorem 1. *Let (C, ϕ) be Martinet-Ramis modulus for (1). Then: $C = 0$, $\phi(z) = z + 2\pi iz^2 + (2\pi i - 4\pi^2)z^3 + \dots$*

Corollary 2. *The system (1) is not analytically orbital equivalent to its formal normal form.*

Keywords: Martinet-Ramis modulus, saddlenode, central manifold

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REFERENCES

- [1] J.P. Jouanolou, "Equations de Pfaff Algebriques", Lecture Notes in Mathematics 708, Springer-Verlag, 1979.
- [2] Martinet, J., Ramis, J.-P., "Classification analytique des equations differentielles non lineaires resonnantes du premier ordre", *Ann. Sci. Ecole Norm. Sup. (4)* 16 (1983), No.4, pp. 571-621.